

WHAT IS CLAIMED IS:

1. A magnetic random access memory comprising:
memory cells each including at least one tunneling
magnetoresistive element which stores information by
5 use of a tunneling magnetoresistive effect and a
selection element which selects the tunneling
magnetoresistive element, and

a read circuit which reads information from the
tunneling magnetoresistive element by applying read
10 voltage to the memory cell and causing a current to
flow through the tunneling magnetoresistive element via
the selection element,

wherein the read circuit includes a voltage
setting section used to apply voltage which makes a
15 resistance variation rate of the tunneling magneto-
resistive element substantially equal to half a
resistance variation rate thereof obtained when 0 V is
applied across the tunneling magnetoresistive element
to the tunneling magnetoresistive element at the
20 information read time.

2. A magnetic random access memory according to
claim 1, in which the memory cells are arranged in a
matrix form and which further comprises word lines each
connected to control electrodes of those of the
25 selection elements of the memory cells which are
arranged on a corresponding one of rows and bit lines
each connected to one-side ends of those of the

tunneling magnetoresistive elements of the memory cells which are arranged on a corresponding one of columns, wherein the read circuit includes a current specifying section which specifies a current flowing through the memory cell, and a comparator section which compares potential corresponding to an intermediate value between "1" and "0" of storage information in the bit line with potential read from the memory cell to read the storage information.

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10 3. A magnetic random access memory according to claim 1, wherein each of the memory cells includes a plurality of tunneling magnetoresistive elements and the other ends of the tunneling magnetoresistive elements of each memory cell are connected to one end of the current path of the selection element.

15 4. A magnetic random access memory according to claim 2, wherein the selection element is a MOSFET and the control electrode is a gate electrode thereof.

20 5. A magnetic random access memory according to claim 2, wherein the selection element is a bipolar transistor and the control electrode is a base electrode thereof.

25 6. A magnetic random access memory according to claim 1, in which the selection element is a diode and the memory cells are arranged in a matrix form and which further comprises word lines each connected to cathodes of those of the diodes which are arranged on a

corresponding one of rows and bit lines each connected to one-side ends of those of the tunneling magnetoresistive elements of the memory cells which are arranged on a corresponding one of columns, wherein the read circuit includes a current specifying section which specifies a current flowing through the memory cell, and a comparator section which compares potential corresponding to an intermediate value between "1" and "0" of storage information in the bit line with potential read from the memory cell to read the storage information.

7. A magnetic random access memory according to claim 6, wherein each of the memory cells includes a plurality of tunneling magnetoresistive elements and the other ends of the tunneling magnetoresistive elements of each memory cell are connected to an anode of the diode.

8. A magnetic random access memory according to claim 3, wherein at least two of the plurality of tunneling magnetoresistive elements connected to the selection element are connected in parallel.

9. A magnetic random access memory according to claim 3, wherein at least two of the plurality of tunneling magnetoresistive elements connected to the selection elements are connected in series.

10. A magnetic random access memory comprising:
memory cells each including at least one tunneling

magnetoresistive element which stores information by use of a tunneling magnetoresistive effect and a selection element which selects the tunneling magnetoresistive element, and

5 a read circuit which reads information from the tunneling magnetoresistive element by applying read voltage to the memory cell and causing a current to flow through the tunneling magnetoresistive element via the selection element,

10 wherein the read circuit includes a voltage setting section used to apply voltage which is higher than the voltage applied to the tunneling magnetoresistive element by at least a voltage drop occurring across the selection element to the tunneling
15 magnetoresistive element at the information read time.

11. A magnetic random access memory according to claim 10, in which the memory cells are arranged in a matrix form and which further comprises word lines each connected to control gates of those of the selection
20 elements of the memory cells which are arranged on a corresponding one of rows and bit lines each connected to one-side ends of the tunneling magnetoresistive elements of the memory cells which are arranged on corresponding one of columns, wherein the read circuit
25 includes a current specifying section which specifies a current flowing through the memory cell, and a comparator section which compares potential

corresponding to an intermediate value between "1" and "0" of storage information in the bit line with potential read from the memory cell to read the storage information.

5 12. A magnetic random access memory according to claim 10, wherein each of the memory cells includes a plurality of tunneling magnetoresistive elements and the other ends of the tunneling magnetoresistive elements of each memory cell are connected to one end
10 of the current path of the selection element.

 13. A magnetic random access memory according to claim 11, wherein the selection element is a MOSFET and the control electrode is a gate electrode thereof.

15 14. A magnetic random access memory according to claim 11, wherein the selection element is a bipolar transistor and the control electrode is a base electrode thereof.

 15. A magnetic random access memory according to claim 10, in which the selection element is a diode and
20 the memory cells are arranged in a matrix form and which further comprises word lines each connected to cathodes of those of the diodes which are arranged on a corresponding one of rows and bit lines each connected to one-side ends of those of the tunneling magneto-
25 resistive elements of the memory cells which are arranged on a corresponding one of columns, wherein the read circuit includes a current specifying section

which specifies a current flowing through the memory cell, and a comparator section which compares potential corresponding to an intermediate value between "1" and "0" of storage information in the bit line with
5 potential read from the memory cell to read the storage information.

16. A magnetic random access memory according to claim 15, wherein each of the memory cells includes a plurality of tunneling magnetoresistive elements and
10 the other ends of the tunneling magnetoresistive elements of each memory cell are connected to an anode of the diode.

17. A magnetic random access memory according to claim 12, wherein at least two of the plurality of
15 tunneling magnetoresistive elements connected to the selection elements are connected in parallel.

18. A magnetic random access memory according to claim 12, wherein at least two of the plurality of tunneling magnetoresistive elements connected to the
20 selection element are connected in series.

19. A magnetic random access memory comprising:
tunneling magnetoresistive elements which store information by use of a tunneling magnetoresistive effect,

25 bit lines connected to one-side ends of the tunneling magnetoresistive elements,
word lines connected to the other ends of the

tunneling magnetoresistive elements, and

a read circuit which reads information from the
tunneling magnetoresistive element by applying read
voltage to the tunneling magnetoresistive elements and
5 causing a current to flow through the tunneling
magnetoresistive element,

wherein the read circuit includes a voltage
setting section used to apply voltage which makes a
resistance variation rate of the tunneling
10 magnetoresistive element substantially equal to half a
resistance variation rate thereof obtained when 0 V is
applied across the tunneling magnetoresistive element
to the tunneling magnetoresistive element at the
information read time.

15 20. A magnetic random access memory according to
claim 19, wherein the tunneling magnetoresistive
elements are arranged in a matrix form and the read
circuit includes a current specifying section which
specifies a current flowing through the tunneling
20 magnetoresistive element and a comparator section which
compares potential corresponding to an intermediate
value between "1" and "0" of storage information in the
bit line with potential read from the tunneling
magnetoresistive element to read the storage
25 information.

21. A magnetic random access memory according to
claim 20, wherein the bit lines are arranged above the

tunneling magnetoresistive elements.

22. A magnetic random access memory according to claim 21, wherein the bit lines are arranged below the tunneling magnetoresistive elements.

5 23. A magnetic random access memory according to claim 20, wherein the word lines are arranged above the tunneling magnetoresistive elements.

24. A magnetic random access memory according to claim 20, wherein the word lines are arranged below the
10 tunneling magnetoresistive elements.